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Aspects of a theory of systemic construction

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Abstract

Purpose – To consider aspects of a theory of systemic construction by discussing two concepts which will assist in our understanding of the surrounding world which it is considered is made of both systemic and non-systemic entities.

Design/methodology/approach – Considers how these entities (metasystem network, transitron etc.) can be conceived and defined. Systemic frames notions are presented and examples of systems given. Discusses the historic use of the word “system” and systemic thinking and its varieties.

Findings – Discovered that on the basis of these concepts, an understanding of the surrounding world can be achieved which is not homogeneous but made of both systemic and non-systemic entities. These can change when certain systemic properties are reached as well as in their specific degrees in their limitations and paradoxes.

Originality/value – Introduces an original approach to the life support system by proposing concepts that are discussed and defined and that will provide cyberneticians and systemists with a revised view of systemic thinking.

Keywords Cybernetics, Systems theory

Paper type Conceptual paper

1. Introduction

One of today’s possible approaches to the life support system includes two statements:

- (1) An entity perceived as system has only the following properties: synergy of its parts, non-entropy within its confines, and ephemerality as the result of higher performances and less resources;
- (2) The systemic world comprises both decisional paradoxes and informational-actional limitations.

The combinatorics and the intensity of the properties, paradoxes, and limitations that characterize an entity are equally descriptive of the variety of thinking (with its effects

The author thanks all his real teachers into understanding and explanation upon Reality. The main text and the bibliography may be seen in this way. But, if the completeness of the “acknowledgments” requires one, two, . . . great names – at least, than are to be considered [as titans of non-systemic profoundness] *Nicolaus Cusanus* (1401-1464) and *Mihai Eminescu* (1850-1889; Romanian greatest poet), and as a double connection between them: *Herbert Simon* (Science of the Artificial; Administrative Behaviour; . . . , satisfaction approach) and *Alexandru de Mocsonyi* (1841-1909; a Romanian predecessor of the contemporary transdisciplinary insight). Special “future-thanks” for the possible colleagues and real teachers in order to enrich the comparative proves for systemic and non-systemic entities; the author hopes for appropriate applications connected with some hard domains: poverty, welfare, social policies, sociology of religion, social psychology, social movements, sociocybernetical insight, comparative studies, lexical and (last but not least) ecological questions/problems.



upon scientific and daily trends of modern thought). Consequently, four varieties of systemic thinking as conceived by four great philosophers are presented: analytic/Descartes, holistic/Plato, experimental/Bacon, experiential/Bergson (experiential refers to the natural, spontaneous facts).

In this context, two concepts are defined regarding the (ideal) life support system: equilibrium and metaequilibrium. Both of them are brought into connection with those four varieties of systemic thinking as a result of the specific contribution of: Spinoza/Russell, Goethe, Leibnitz, and respectively Cusanus.

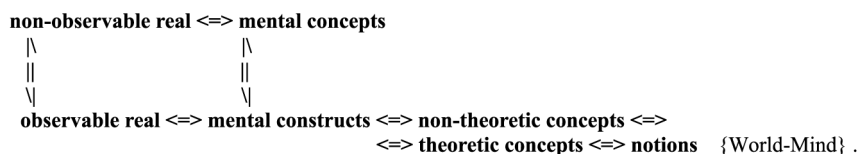
On the basis of these concepts can be achieved an understanding of the surrounding world, not as homogeneous, but made of both systemic and non-systemic entities (metasystem, network, transatron. . .). All these entities may and can turn themselves one another if they reach certain parameters of the above-mentioned systemic properties, as well as specific degrees in their limitations and paradoxes.

A glossary of the terms used is included as an appendix to this paper.

2. Proper ordering of some systemic frames notions

If it is accepted that the existence of our world is represented by a set of real entities and by a set of concept entities, then a rational subject delimitates the observable from the non-observable real and the theoretic concepts from the non-theoretic concepts.

Only not instant clear connections are possible between the four delimited parts enumerated above. The fuzziness of this possibility is proper to each action of humankind toward micro and toward macrocosmos domain (and proper nearly to each rational subject). However, the following potential world-mind reservoir (shortly, **{World-Mind}**) relation (as a type of representation) is to be accepted as a background to the intended ordering of some proper systemic frame notions:



The mental construct is the “word peak” of at least one mental concept; a mental concept is an innate and/or actively obtained structural-phenomenological mind entity; the notion is at least one “word peak” of the non-theoretic concepts and theoretic concepts.

2.1 System-Information relation

Inside the {world-mind} context, there is an aggregation of resources to be understood/explained as a system; the system can coordinate its resources. If the resources are both human and technical, then their team-aggregation hierarchically erects a mixed system. Into mixed system the resources and the teams’ local information are aggregated according to the supreme goal and the decisions are expanded according to all local goals; the overall goal of a mixed system is attained as long-term cycles of information-decision-action which are functionally, structurally and conceptually adapted.

As cases of systemic aggregates of resources that would not be mixed system:

- an interplanetary autonomous station which has definitively failed transmissions with its base;
- a locked nuclear electro-station;
- an ancient mechanism the functionality of which is forgotten; and
- a wasteland/deserted city.

So, these are exceptions. A mixed system is a quasi-generalized long-termed human-machine reality – and a significant part of the life support systems.

Inside the mixed system context, a three-side ego unity reveals itself: the (hypothetical) real ego, this one's own model, and the ideal ego (connected to its implemented norms). This triad: (hypothetical) real-model-ideal would be adequate for any system (not for mixed system only), if exist systems of ideas, words, models, ideals, (religious) beliefs. Are all these systems so separate from human machine systemic background (ephemeral background)? Maybe... A mental travel through {world-mind} – can be a beneficial one as concerns this question. What about nature and information? Is this travel possible without a human nature?

2.1.1 (Hypothetical) real system. According to an extreme condensation of notions proper to contemporary cognition, the matter may be the open triad: substance, energy, information. An essential opening to the matter triad is concerned with the variety of the world (as any observer perceives it).

If the reality of some material concentrations and the relative contours of these concentrations succeed the variety of the world (and not its general homogeneity), then the existence of some objective elements is a natural one. Their plurality (as number of realizations, variances, similitude, distinctions) would group these objective elements on the level(s).

Both the overall space and time might be dual to the objective element and level. An objective element may have sub-elements on sub-levels, or may aggregate itself together with other objective element – the result being an objective element on a super-level.

An objective element is implicitly generated on a (hypothetical initial generated) level, may become there and may generate another objective element even on the same level, or on the other levels – “beside”, “inside”, “above”, “under”,...

The same set of objective element absorbs at least one “under” objective element, and sinks “above” no more than one objective element. Fundamentally, this phrase is an “emergent pattern” of the objective element world intelligence (or of something “similar” to intelligence) and/or of a supreme objective element (God). But in fact this phrase is one of the phrases possible. The rational subject is not implied ontologically here, as it must not be across all this sub-sub-section (2.1.1.). Although this arborescent vision from micro toward macrocosmos may be too elementary, there may exist supplementary levels, forbidden levels, profound zones. Both the biological level and the social one (both very close to rational subject) contain complexities.

Cases of profound zones correspond to: rationality, decidability, markets, social, ethnic, religious and ecological tensions,..., Cosmos inside universe. Cases of supplementary levels correspond to: Cosmos and earth life strata, economic and political revolutionized human societies, universal cognition in spite of discontinuities. Fuzzy denominated cases for supplementary levels would occur as forbidden levels.

Objective elements – after having been generated – restructure themselves, or are restructured more freely than levels. The stability/instability of an objective element and level is to be comprehended as a successive characteristic derived from the generability of the objective element and level.

2.1.2 Model of the system. Our world of objective element contains objective element/level and the relations between these objective element/level. The reflection is a connection between two objective element, of which the clear and absolutely passive one is the reflected and the other one is the reflector (passive or active). The reflector generates information that is an element of reflection, shortly information-reflection element. This information-reflection element is not substance or energy lost by the reflected part. Through a chaotic stream in the information-reflection element and other objective elements (non-parts to current reflection), there are some active steps upon information-reflection element (re)generation, memorization, representation, representation of representation. All these, taken globally or piece by piece, instantly or over a certain period (a chronological period – from “Kronos”-Greek word/notion equivalent to “Tempus”-Latin word; or another suitable period: kairoic – from “Kairos”-Greek (apart) word/notion for suitable moment) are steps of the reflector objective element, or of other associated objective element, upon the reflected objective element. So, a model of the lately mentioned one is erected as artifact on a real support.

Inside a mixed system, an information erected as model, shortly an information-model, has its own way and it is also an artifact, dual to the first artifact – the support – and dual to the reflected objective element too. The position of objective information (objective model recognized inside the mixed system) may be reached or not. If all cycles of becoming are efficiently closed, after a period of time, mixed system is assuming that the current model is an objective information (not a false, dangerous, inutile chimera). An objective information is an objective element. The stability of an objective information, the ascending/descending position of information-model, objective information and of the real objective element reflected, and of the real objective element involved for modeling are correlated.

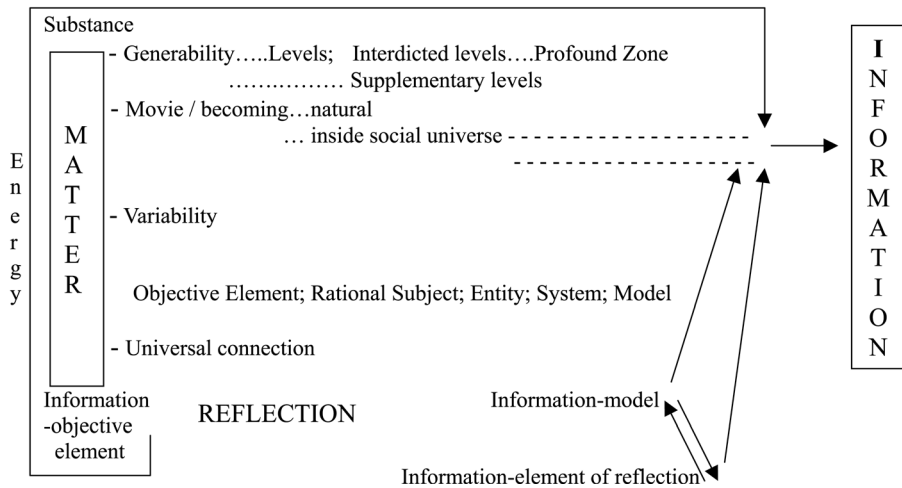
Information-model travel through {world-mind} relation is equivalent to information-reflection element transit and becoming as objective information.

2.1.3 Ideal system. Any mixed system contains teams (at least one). These teams are specialized to act at the forecasted, planned, organized, decided, coordinate and/or controlled locus (distributed in space-time separately or in parallel). Mixed systems are built out of initial action, but problems may occur, are constituted. To represent and solve the problem (in parallel dealing with initial action) is the main craft of a rational subject inside mixed system. Rational subject is a member of an *ad hoc*, preventive/operative team, a human resource coupled with technical resources.

There is not a chaotic long-termed chance into a sustainable mixed system. Life support systems use chaotic events intelligently. Otherwise survival is not possible. For mixed system, as for particular life support systems, the sustainability exists.

Each sustainable mixed system draws out a set of norms in order to recognize the correct from the incorrect action, an initial action or a solving problem case. The “quantity” of norms (connected to mixed system corpus), their becoming as values, ideals, their stability, their adaptation or not are long-term results that constitute the background for totalitarianism, oscillations, relative evolution (decline, stationary, development).

Figure 1.
System-information
relationship



The human resource from a mixed system may be a quasi-technical one or a supreme one. The ideal system possesses the main part of the answer, but not the whole answer.

So, if there are real sequences of information-reflection element, information-model, and objective information, and if the three-sided ego of a system exists – (hypothetical) real, model, ideal – and survives, then the system-information relation is constructed by the model-ego and information-model connection. This connection is a travel pattern through {world-mind}. Figure 1 tries to synthesize all these. All these exist for a particular mixed system, and are expected for an entire set of sustainable mixed system, and are projected, mapped image-notions for other systems. For example, an idea system – a particular one – may be that of the idea upon mixed system.

2.2 Objective element, rational subject, entity, system

There exists an inner part of an epistemic strategy: to define objective element, to erect a triadic view both upon the system and information, to erect an analytical view upon rational subject (a minimal one), and then to construct the “entity” notion, and only after all these to elicit the “system” notion.

A rational subject is an objective element, it is a reflector (at least); but rational subject is able to reflect its own reflection (a superior step in comparison with the representation of the representation).

Figure 2 presents the possible cases of rational subject and objective element coupling. The entity notion refers to this couple. An entity may contain one or more objective element, in their sameness. The rational subject, itself, may be a long-term assumption, as well as a medium capable rational entity (! seen by another rational subject, complied with the medium one; that is the statistics view, but not only). So, the multiplicity view inside an entity is a rational subject’s craft upon the reality of the world of objective elements, outlined only through its rational capacities.

Unlike the entity, the system is independent of the rational subject branch. The concrete system is unique. Any kind of concrete system can be melted into the “system” notion frame. Where is the rational subject placed? Evidently it is very close to some systems (to rational subject it is one sequence identical, but no more); to other

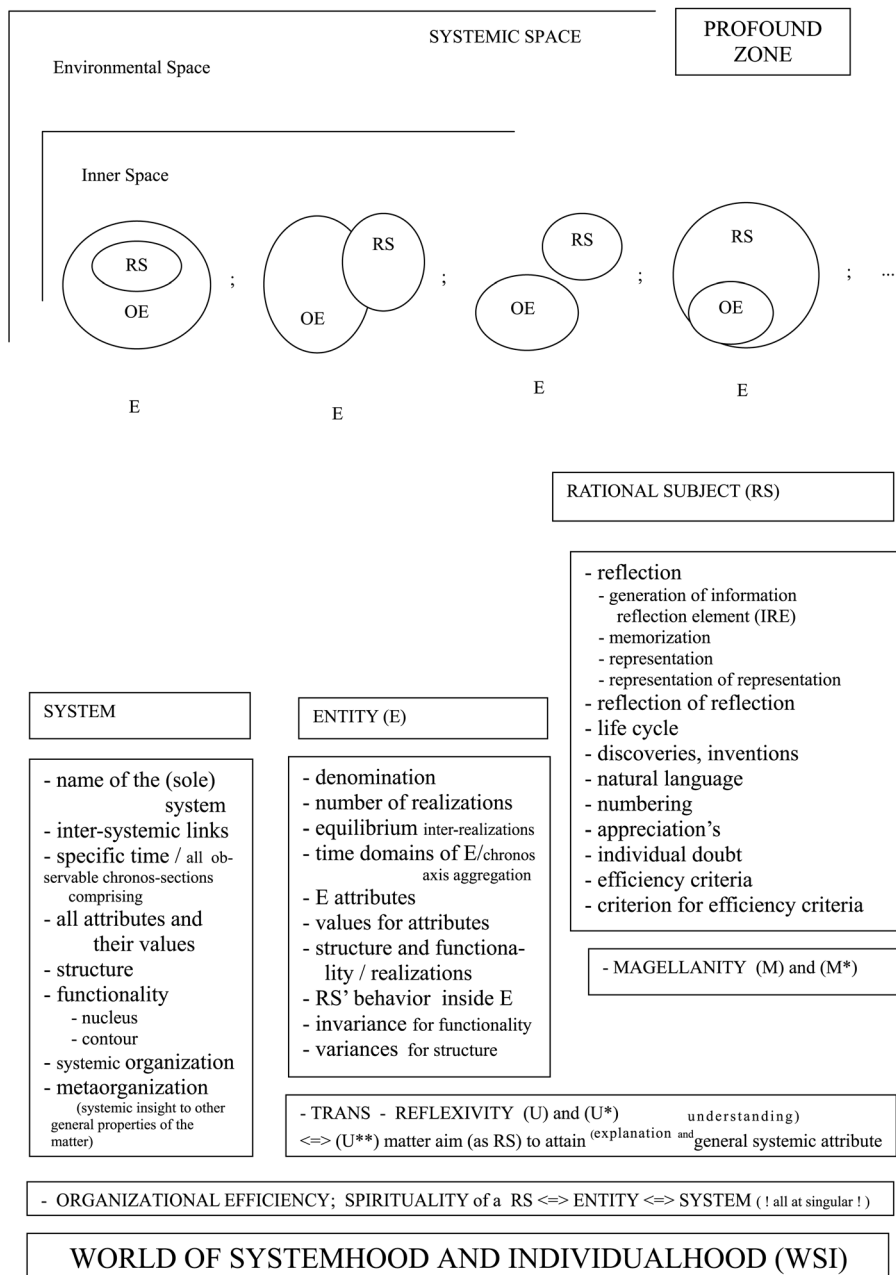


Figure 2.
Possible cases of rational
subject and objective
element coupling

systems it is very apart (e.g. cosmos, micro/micro universe). But “system” notion support all these (as the “entity” notion can support “all” the events).

This approach is intended to be a tool (here only a Gnostic one acting toward the epistemic stage) for revealing the order existent in an amalgamated systemic world – i.e. objective element, rational subject (hypothetical) real systems, idea, a.s.o.)

2.3 Magellanity

All the above sub-sections contain exercises for {world-mind} traveling. Traveling through (world-mind), a rational subject fulfills a very particular task (e.g. What about personal qualification?) or a more sophisticated one (e.g. What about a general system?) The {world-mind} context must reveal an indicatory property – “easy” to be verified conceptually at least).

If there is an equipoise, e.g. an equilibrate square, or linear shape of non-observable real, observable real, mental concepts, and mental constructs, and if rational subject is from the first time convinced upon this (relative to a clear questioned domain), then rational subject reaches the magellanity proper to its {world-mind} travel. This property denomination is connected to [Fernão de Magalhães] Magellan’s 1521 travel (finished by a part of his crew – and not by himself, who died before), the first time when the definitive conviction upon earth’s spherical shape was reached.

So, the magellanity property (shortly (M*)) consists of:

There is *non-observable real* \Leftrightarrow *notions* connections inside {world-mind} (M*).

3. Historic survey across “system” word using/“system” notion becoming

3.1 Before and after Aristotle’s “sustema”

The word “system” is used four times in Aristotle’s *Metaphysika*. There are the negative references at “Plato’s Ideas system” (twice explicitly). Aristotle analyses the entire Greek philosophical background, and especially rejects Plato’s axiom: The Ideas’ existence as numbers, with their substantiality. In his turn, he constructs the double axiom: The existence of an eternal, unmovable, and apart of any sensitiveness substance; the thinking (of this substance) thinks upon itself. The divine element (which seems comprised by the intellect) belongs to the first unmovable movement. Aristotle constructs an entire coherent metaphysical system analyzing, criticizing, and eliciting new ideas.

The entire philosophical thinking, directly or indirectly known by Aristotle, is the challenge emerging his own system. So, Plato’s system as “stimulus” consists from: Aristotle’s direct understanding as Plato’s disciple at the Academia and later recollections, Plato’s written dialogues – at that stage, and Speusip’s discourse upon ideas (after Plato’s death, Speusip is the leader/scholar of the Academia: 347-339 BC); Aristotle returned in Athens as late as 335 BC. Thus, there are a lot of references to ideas: four as “system” (above-mentioned), five as “theory”, and 42 simply as idea(s). This heterogeneous denomination may prove a relative subjectivity and/or a relative local desired nuisance of “system” word philosophical use (maybe even its first appearance, but this must be proved).

Thus, the first time when the word “system” appears seems not to be an isolated cognitive event (inside a philosophic system); this is so because:

- (1) A set of philosophic ideas becomes (is recognized as) a system according to its coherence; that is: wide spreading, resistance at sophistic questionnaire, inner consistence, outstanding synthesis of the entire set (text). So, Aristotle rejects the meaning of the Plato's texts, but does not deny their "system" status [Then, the same case is for Aristotle's *Metaphysika*]. This systemic perception of a text (simultaneous "system" word use) was indebted to long-termed, critically overlapped sequences of lives, genial works, and teaching disciples. The following string sets only nine philosophers and four generals/political leaders from a great ancient Greek plead:

- Pythagoras (c.570-c.480 BC),
- Heraclitus (c.550-c.480 BC),
- Themistokles (525-460 BC),
- Parmenides (c.515-c.440 BC),
- Anaxagoras (c.500-428 BC),
- Pericle (c.495-429 BC),
- Empedokles (c.490-430 BC),
- Protagoras (c.486-410 BC),
- Sokrates (c.470-399 BC),
- Alcibiade (c.450-404 BC),
- Plato (c.427-347 BC),
- Aristotles (384-322 BC),
- Alexander the Great (356-323 BC).

This string would demonstrate that two centuries of vibrant linked thinking and acting elicited a systemic perception; high mind and status were the background for it.

- It is questionable whether Aristotle is the first to use the word "sustema". The etymology of this word is: "sun" = "with" and "istemi" = "to put"/resulting the meaning "to be put with the other parts".
- It is clear that both Plato's and Aristotle's texts (styles and contents) influenced the becoming of systemic perceptions during scholastics and renaissance/q.v. a frequent use of the word "system", in the Germanic space, during 1604-1613; here are four titles of now anonymous authors: "Logicae systema methodicum", "Systema problematum theologorum", "Logicae systema harmonium", "Systema systematum". The Latin "Systema" from the original Greek "sustema" is observable; the vowel "u" being ancient, Greek admitted it as Y/u (capital letter/usual letter) [It is said that Pythagoras used Y as a symbol of the divergent path of vice and virtue.].

But the systemic assumption was only scarcely dealt with during the migration millennium, and the religious and social middle age quarrels.

More perceptions of the ever-implicit humankind stronger systemic thinking are something as "Phoenix bird myth". Our millennium is characterized by a continuous rise of the systemic perception and thinking, starting from the nominalist philosophers/q.v. William Ockham (c.1285-1349) "Summa logicae"/up

to now. It is critical and repetitive of Plato's or Aristotle's frame; that is to cast new elicited knowledge into a implicit systemic frame. Did the same phenomenon occur before Plato and Aristotle? This must be searched for and proved. If it is so, then the systemic perception may be an innate cognitive process (based on some natural mental concept as well).

But also it may not be so, if long-term and gradually obtained systemic ideas and mental are involved constructs/q.v. the general type {world-mind} relation, the string plead from (a); magellanity property is to be reached by an {world-mind} type traveling rational subject which requires "systemic thinking".

And yet it may be both an innate concepts and an obtained constructs. Magellanity property (M*) is apparently easier to be reached if both innate concepts and obtained constructs are involved.

That is why systemic perception is so important to be studied according to all [these three] possible directions [or to some other].

- Another very important and strange fact is Aristotle's treatment of the "part" and the "whole" (Metaphysika,V, 25,VII, 10; and V, 26). At that time this had nothing [?] to do with the use of the word "sustema". It seems the "sustema" applies only for philosophical "whole" (but it is only a hypothesis). The immediately following treatment of the "curtailment" (V, 27) is an important argument for this article (dealing with non-systemic entities also).
- A long pre-Aristotelian tradition exists regarding the delimitation and denomination of the "true" and "false" domains. Parmenide, Empedokles, Protagoras, Plato have built a complex "pre-Organon" as a tetravalent logic acting with: science (episteme), true opinion (alethes doxe), and no-science (agnoia), false opinion (pseudes doxe). A contemporary subject of research deals with the Aristotelian "excluded third party (tertium)" principle versus pre-Aristotelian points of view. This subject of research is engaged versus Lukasiewicz's polyvalent logics. This aim is quasi-equivalent and infra correlated to (3). The last proposition of (3) may be reiterated. [The title "Metaphysika" is non-aristotelian. Andronicos from Rodos (1 sec. BC) placed this text after those from Physika ("meta ta physika"); what about "sustema" impact and its reusing?]

3.2 The systemic thinking and "General System Theory" idea

Humankind promoted systemic thinking implicitly from Aristotle's "sustema" (at least) till the twentieth century. If the "system" construct was born for Plato's philosophical entity realization, and if some other philosophical entities as systems were assumed, then the challenge of the assumption of a living being as system (regarding all life support, earthly individuals) was a necessary threshold. But the contradictory dichotic viewpoints: "mechanistic vitalism/organismic" have delayed a modern climax regarding systemic thinking as well as "system" construct. This dichotomy was stated by Julien Offroy de la Mettrie – "The machine human", 1747/Johann Michael Schmidt – "Treaty about music and soul", 1754. No prominent complementary viewpoint appeared to try to overpass this contradiction. The turning point was when Ludwig von Bertalanffy's studied, researched, formulated, and published "General System Theory" (1928-1973) – focused on "An Outline of General System Theory" –

British Journal of Philosophy of Science, 1, 134-164, 1950; then the (double) edition of "General System Theory/Foundation, Development, Application" – at Penguin Books and George Brazillier, 1968. His life nearly spans the twentieth century; of Austrian origin, naturalist emigrated in Canada, professor at Vienna, Ottawa, Los Angeles, Alberta. He was deeply involved both in Charles Morris' philosophical seminar at Chicago University, 1937 (his general systemic aim being not accepted), and in biophysical research at Mount Sinai Hospital, USA, 1955-1958. His research upon the metabolism and growth conducts him to a theory of open systems comprising notions as: steady states, equi-finality, goal-seeking; equi-finality is a complementary principle (to the classical cause-effect relation) according to which final outcomes can be achieved by starting from different original conditions and along different paths. An organism is an open system, exchanging substance, energy and information (recorded on a substantial or energetic support) with its environment; its elements and processes are ordered so as the entire whole to reach the essential goal: integrity preservation. An organism assimilates according to its surface (frontier), and dissimilates according to its mass(weight). Bertalanffy succeeded in a transfer of notions, ideas, mental constructs from biology toward an abstract description of Reality, of the concrete in this way obtaining a better understanding of it. But then followed a slow, not instant defeat of biological reductionism and of sociological reductionism (biological processes seen as mechanistic physical-chemical as well as social processes seen as a biological). Meantime, Bertalanffy internalized a set of scientific and humanistic works as a promotion of "system" construct history, in spite of its not being emphasized. Thus, he starts his treaty with a list of thrilling Latin adliterated names of: Nicolaus Cusanus (1401-1464), Goffried Leibnitz (1646-1716), Wolfgang Goethe (1749-1832), Aldous Huxley (1894-1963), Bertrand Russell (1872-1970); at the end of this quasi-chronological list "S.J. antecesor cosmographi" is inscribed as a (possible) homage to those ancient and medieval comprehensors of the Cosmos, and to the modern descriptors of the astronomic objects – implicitly concerned with a globalist, systemic view ("Cosmos" word/idea was introduced by Pythagoras as the supreme order and harmony). But the full text contains – unchronological ordering – references only for Leibnitz (natural philosophy), Cusanus (coincidence of the opposites), and for Paracelsus (mystic medicine), Vico and Ibn-Khaldun (history vision as cyclic cultural entities sequences or "systems"), Marx and Hegel (dialectics), Herman Hesse (reflected world trajectory as intelligent projected abstract game), Kohler (1924, 1927 – physical gestalten) and Lotke (1925) – the last two considered for their preliminary works to general system theory.

All these prove this late nuisance. General system idea has an influence during its some decade promotion or/and was brought as a base for the efforts, usually the reference being the general systems theory. There are (were) scientists as chiefs of research and/or university teams-real contemporary stages corresponding to Plato's Academia and Aristotle's Lyceum:

- (1) *R.E. Kalman's dynamical system theory* (mathematical topics) conceptualizing inputs/outputs behavior with "state space". A state of dynamic system comprises the minimal information required to draw the entire system from a possible additive input to a desired finite output. It is the actual reverse of Leibnitz's and Newton's analytic methodology (q.v. V_L of systemic thinking). An inductive construction of a dynamic system versus an experimental set is "the realization problem" (evaluation of a function by an automaton, pattern

recognition, simulation of a tolerance automaton). It is a prominent epistemic bridge between Descartes' rationalism and Bacon's experimentalism. But it is also a duality, which supports the reachability, observability, controllability and constructability of complex technical objects (as by time-optimal control closed loop is involved).

- (2) *M.D. Mesarovic's hierarchical systems theory* (coupled with a mathematical theory of coordination) presents the conceptualization, formalization and application domains for multilateral structures (strata, layers, echelons) emerging the coordination problem of the subsystems and the decision-making. This universe of man-made stratified systems was highly comprised after a theoretical accumulation indebted to N. Wiener, L. von Bertalanffy and H. Simon and to their disciples. Also, truly large organizations (industrial enterprises and bureaucracy) were a challenge to the researchers from the 1960 decade to find the path of scientific change of operation and administration. The system – analogically defined – is a relation on the Cartesian product between its (mathematical) objects. New coordination methods are assessed according to the so-called “balance” and “estimation” interaction principles, “interaction decoupling” methodology being enrolled.
- (3) *G.J. Klir's epistemological hierarchy of systems categories* builds the system construct as a mathematical object – a relation between abstract entities. It is qualified as a model of some feature of the Reality (natural, social, human-made parts) if and only if there exists a “homomorphism” related to the mapping of the entities from Reality and the respective entities from the system construct. So, a “thinghood” and a “systemhood” may be homomorphically interrelated if a rational subject gradually rises in Klir's epistemological hierarchy (! and climbs the corresponding deepness of the Reality simultaneously!).

Let there be a medium-support (time, space or a population). There exists a bottom experimental frame or “source system”; when actual data are available (as a description language assures) a “data system” is reached; when the relation between the variables (assigned to the data) is invariant in relation to the initial media-support the “behavior system” is reached.

Let there be two principles operating as rising inside epistemological hierarchy, and resulting systems integration as larger systems:

- If two or more behavior systems (or respective data or experimental systems) have common variables or interact then they are integrated as an overall “structure system”.
- If there is an invariant procedure of replacement from a system to another system (both on the same horizontal epistemological layer), and if this invariance is in accordance with the initial medium-support, then those “replaced” systems are integrated as an overall “metasystem”. Both structure systems and metasystems may produce a second, third, a.s.o. order integration for themselves as a similar superior order interselves. So, a epistemological hierarchy is revealed. In these terms, the systems science is not another science but a metamethodology, a new scientific dimension for abstract knowledge structuring. The abstract knowledge may be simulated, the artificial life technique being evolved. So, if a rational subject is rising inside epistemological

hierarchy, then it can realize a string of progressive insights (as systems) from bottom toward its layer (and never higher).

Kalman's, Mesarovic's, and Klir's personal ideas and their teams publications were a intense indirect support for a general systems theory (systems – not system !), during the 1960-decade. It was a mathematics major approach (characterized by a diversity of trends), but simultaneously very explicit as foundations and applicability. It was wide spread, its “propagation wave” has passed the 1990-decade as a necessary stage anywhere. There were consequent researches from:

- (1) *Domain* as the robust multivariable control, parallel processing (analogue, digital and hybrid-microelectronics superimposed digital processing), non-linear process control, interactive learning and adaptive control for language scale systems. *H*_controller synthesis and system identification will promote general system as automaton.
- (2) *Domain* as an interactive decision stratum for the multilevel and hierarchical world model; with the world seen as ten regions with countries grouped according to their economical, social, political and psychological similarities. This “Strategy for Survival” (intended as a computer-based planning and decision-making tool) is one of the famous predictive world models at the end of twentieth century.
- (3) *Domain* corroborated with the infra specialization inside logics; to mention only two researches (very close to general system idea): R. Mattessich's “Theory and its Correspondence to Reality” – {world-mind} relation is very indebted to his work from 1990; and R.Vallée's “Epistemo-Praxiology” – a “well tempered constructivism” – 1995, which links objectivity and subjectivity via multidimensional perception, decision and action; as a balanced mathematics and philosophic approach it can assure one of the incompatibility between system science and any mystery search.

A. Newell, J.C. Shaw and H. Simon concretized a long-term dream by a program that simulates human thought: *General Problem Solver* (1958-1963). This creative effort is parallel to general system(s) theory – but it is possible that some common mental concepts emerged through both these two directions. General problem solver is the real initial implosion-point for a long string of efforts; these are denominated as *Artificial Intelligence*. One of the earlier proofs that both directions are overlapped is that Mesarovic and Klir dealt with human reasoning.

Artificial Intelligence is the actual base of the expert systems, which are a real challenge for automation (1) domain (so, another particular argument for the overlapping of the two directions).

The necessity of specific industrial control and the (attractive field and specific versatility of human reasoning researches in accordance with) pattern recognition are the premises of *neural network domain*. Surpassing a kind of unpractical initial enthusiasm, aggregating some major scientific advances, the neural network is also a long-term human research: F. Rosenblatt's perception (1958) and J.Hopfield's “Neural” computative of decision (1985) are classical topics today.

PINK generation of artifacts (psychology, intelligence, neural, knowledge) is a present and future world. Expert systems and neural networks are seen sometimes as

successive and as a continuum too. However, these two directions have an independent future versus their systemic implementation. It is not a common fact that systems theory and cybernetics, computer science, artificial intelligence, neural network, operational research, microelectronics, communication have and will have “fascicular” development. Their long-term “inside this fasciculum isolation” reduces respective possible interdisciplinary efforts. In spite of this, management science, cognitive science, philosophy of mind, bioengineering, bioeconomics, cyberspace development and ecology, are very indebted to the entire fasciculum mentioned above and also to general system theory ideas. Will they continue to be so indebted?

On the other side, there are institutional long-term attempts for systemic deep interdisciplinary insight (the list is ordered under the alphabetic appearance of the host country):

- International Institute of Applied System Analysis, Laxenburg, Austria.
- Center for Hyperincursion and Anticipation in Ordered Systems from the Institute of mathematics, University of Liege, Belgium/Daniel D. Dubois.
- International Institute for Advanced Studies in Systems, Windsor, Canada/E.G. Lasker (Synergism and Sociopolitical development).
- Institute of Interdisciplinary Studies (teaching and research: language and cognition; representation and learning)/Carleton University, CA.
- Trent University, Peterborough (Applications of modeling in the natural and social sciences (quantitative modeling; cross-disciplinary communication within one discipline training), CA.
- International Research and Transdisciplinary Studies Centre, Paris, France/B. Nicolescu – Transhumanism.
- Center for Synergetics from the Institute for Theoretical Physics I, Center for Synergetics, University of Stuttgart, Germany/Herman P.J. Haken.
- Decision Support Network for Strategy Development and Problem-Solving, Germany.
- International Institute for Advanced Studies, Kansai Science City, Japan.
- Center for the Study of Social Stratification and Inequality, Graduate School of Arts and Letters, Tohoku University, Sendai, Japan.
- Institute of the World Organisation of Systems and Cybernetics, and University of Wales, Bangor, UK/Brian H. Rudall; World Organisation of Systems and Cybernetics is foundational indebted – also – to Robert Vallée, France.
- Institute of Cybernetics, Brunel University, Middlesex, UK and University of Central Lancashire, UK/James N. Rose.
- Santa Fe Complex Adaptive Systems Institute, USA.
- Global Development Network, Washington, USA.
- Institute for the study of Complex Systems, Palo Alto, U.S.A./P. Corning (Synergism self-organization dichotomy).
- Academy of Transdisciplinary Education and Research, Mechanical Engineering Department, Texas Tech University, USA.

- Cognitive Science Faculty (research areas: language; representation, reasoning and learning; vision and action)/University of Rochester, USA.
- Center for Language and Speech Processing (interferes with biomedical engineering; cognitive science, computer science, electrical and computer engineering, mathematical sciences, psychology)/Johns Hopkins University, Baltimore, USA.

Another side consists from:

- World Organisation of Systems and Cybernetics is/a network of nearly 1,000 scientist; more than 30 systemic intra_entities; world congresses from three to three years (the last: Pittsburg, March 2002).
- International Sociological Association/a network of nearly 4,000 scientist; more than 70 systemic intra_entities; world congresses from four to five years (the last: Brisbane, July 2002).
- International Union of Anthropological and Ethnological Sciences/a network of nearly 5,000 scientist; more than systemic 50 intra_entities; world congresses from five to five years (the last: Florence, July 2003).
- International Simulation and Gaming Association – annual conferences, from 1970; related methodologies: computerized simulation, policy exercises, role-play, experiential exercises, play, structured experiences, game theory, operational gaming.

On the other hand, sociocybernetics is a firmly, explicitly indebted domain to twentieth century fundamentals and a strong interdisciplinary contemporary approach too. It is possible for sociocybernetic background to be a contemporary efficient domain to rise a reconstruction of general system theory idea. That would be possible through an *interdisciplinary long-term open debate among research teams, virtually represented by (the list is ordered under the alphabetic appearance of scientist's name):*

- H.W. Ahlemeyer, O. van Nieuwenhuijze, T.Perez de Guzman – complexity;
- K.D. Bailey – social system entropy;
- E. Barbieri Massini, F.Geyer – future and social science;
- B. Buchanan – assessing human values;
- T. Burns – socio-cultural systems;
- T. Devezas – techonospheres;
- B. Hornung – integration \Leftrightarrow society;
- L. Langman, F. Geyer – alienation;
- J. Mingers, P.Barbesino – autopoiesis;
- F. Parra-Luna – society \Leftrightarrow axiology;
- N. Romm – responsibility;
- B. Scott, G.M.C.I. Boyd, A.V. Jdanko – education.
- P. Stokes, M.G. Terpstra, P. Nicolopoulos, H.J.L. Voets – organization;
- P. Stokes, M.G. Terpstra, P. Nicolopoulos, H.J.L. Voets – organization; and

- J. van der Zouwen, C. van Dijkum, D.J. DeTombe, I. Kratli, R.L. Henshel – sociocybernetic methodology

The last (but not least, subjective) systemic and interdisciplinary insight ensued here is represented by past and renewed alternative approaches:

- V. Turchin, C. Joslyn, F. Heylighen – Principia Cybernetica Project (computer-supported cooperative development of an evolutionary-systemic Philosophy);
- F. Heylighen, and M. Vaneechoutte – memetics (concepts, evolutionary mechanisms, computers and networks, social sciences);
- N.C. Callaos – CD-ROM extended encyclopedia of systemics, informatics and cybernetics;
- A. Behrooz – Knowledge Transfer annual international conferences, at the University of London from 1996/from 1999 in Romania;
- A large and foundational insight was supported by Professor Stafford Beer and Dr. Heinz von Foerster;
- A variety of advanced studies is supported by G. Andonian, E. Andreewsky, AM. Andrew, R. Bartley, M. Belis, M.L. Best, J.M. Bishop, W. Buchley, A. Carron, J.L.R. Chandler, H-F. Chen, Y. Cherrault, T.N. Clark, P. Constantinescu, A.B. Engel, M. Cruz, V. Dimitrov, D. Dubois, J. Evers, E. Engdall, V. Fomichov, A. Garcia-Olivarez, I. Gilbert, A. Gosal, C. Greiner, R.W. Grubbström, L. Guoyang, X. Guangcheng, J. Hiller, A. Irwin, G. Jasso, H. Katz, A. Kjellman, B. Kochel, T. Koizumi, I. Krattli, V.I. Kvitash, Y.T. Leong, E.T. Lee, E. Lleras, M. Malitza, P. Marsden, M.E. Martinez, P. Masani, G. Marshall, M. Manescu, L. Medek, H. Miki, S. Milcu, D. Moerenhout, D. Murphy, C.V. Negoita, Ed. Nicolau, G.M. Nielsen, S. Odobleja, M. Oussalah, W. van Oorschot, Th. Quinn, P.J. Querinjean, J. Radice, B.N. Rossiter, D.O. Rudin, H. Sabelli, V. Sahleanu, S. Santoli, A.R. Scuschny, E. Schwarz, M.C.B. Smith, D. Steeg, D.J. Stewart, A. Sugerman, E. Rynen, L. Tao, R.J. Taormina, C.C. Valentino, R. Vulcanescu, J. Wood, B. Warburton, B. Zeeberg – all of them being systemist inside their own domain but the interdisciplinary aim is ever present.

All these “other sides” are not the only direct effects of the long-term Bertalanffy’s idea; it is a “propagation wave” inward its cognitive effect. There is a heterogeneous generation devoted to systemic thinking. This includes the Stockholm International Peace Research Institute (after G. Myrdal), and the Club from Rome (Prince Hassan Bin Talal, A. Peccei, A. King. .).

These seems to be a variety of paradigms resulting from the complexity of systemic world. Their aggregation is not a stimulus for an attempt toward a reconstruction of a general system theory. Returning to Bertalanffy’s climax, the following question appears today: did he reach a magellanity property according to his travel through (world-mind)? No. This is indeed to be expected, but of another stage, that of epistemic thinking confidence. Did (a), (b), (c), and their successors and their parallel challengers reach a magellanity property {world-mind} traveling? Nearly yes, but strictly for each domain (seen not as a finite aggregation of subdomains), and even a contemporary refinement is to be on the role. That is only “nearly yes” above. But it seems that there

are: an {world-mind} travel for natural, an {world-mind} travel for social, and an {world-mind} travel for human-made systems [so, three different varieties]. And for each of them the infraseparability is a question in itself. That is why, at a turning point, “General System Theory” was overwhelmed by “General Systems Theory”, during the 1970 decade. Is there a confidence in a variety of systemic thinking? That is the problem in the next paragraph. [But “General System Theories” for M. Bunge – a promoter of a “Yes”-1977 answer for the last previous question.]

Figure 3 shows an iconic solution to all these according to a human (supposed) trans-reflexivity. Inside this figure this property is gradually iconic and implicitly defined; the symbol U is inspired from a text of Unamuno (during a conversation between two persons, there are six persons: the original two, two reflexive images of their selves, and an other two by which the two persons represent each other.). Gradual task for Unamuno property is depicted as (U) – for each separated domain/nature, artefact, and social/, (U*) for ideas domain, and (U**) for the general system idea.

4. Systemic thinking and its varieties

The human psychic system is a concomitant objective element (objective element) on the physic, biologic, social and cultural levels. Human psychic system is a real

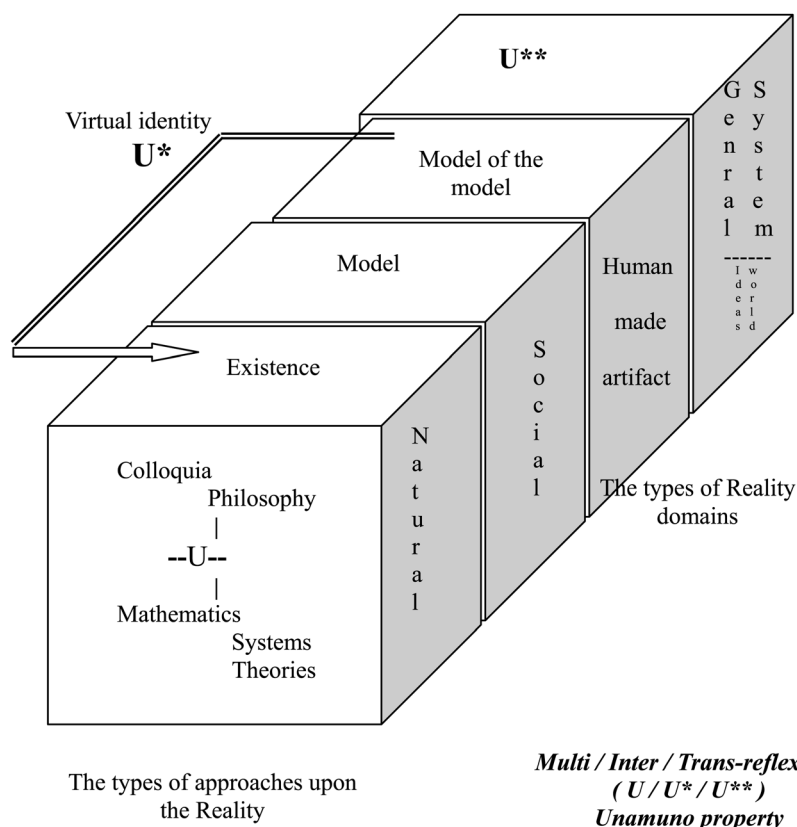


Figure 3.
Multi/inter/trans-
reflexivity (U/U*/U**)
Unamuno property

“different universe” dedicated to the reflection of the primary universe and to the reflection of the reflection. The possibility of the both reflections is provided by: the hyper complexity of 24 milliards neurons (each maintains 10 millions branched connections with the others), the hierarchical structure of this fabulous amount of neurons – an enchanting carpet, the selforganizing mechanisms, the interaction of the sensorial cognitive self regulated processes. The consciousness phenomenon controls the set of psychic functions (also the creative function); the emergence of the consciousness beings upon the self’s existence. A strange bipolarity of the human psychic system is possibly indebted to the interference between the conscious stratum (aware ego and its consciousness) and the (pre)underconscious and, respectively, the (trans)unconscious stratum. The thinking is the central cognitive process of the human psychic system and the implicit denomination of the rational subject. The contents of the (mental) concept, the statement, and the reasoning emerge through superior analysis and synthesis, coordinated abstractization and generalization. The interference of the heuristics with the algorithms, the cognitive learning with the semantic decoding constructs the representation and the solving problem. Both these constructs appear as a necessary peak of thinking, and also as an ever “visible face” of the intelligence, and in fact of human psychic system.

- To think in a systemic way means to:
- necessitate the operation with the world of the exterior disposed to self systems,
 - maintain the systems’ world by (self)solving the problems sufficiently (these are adjacently disposed to self-constituted problems),
 - sufficiently necessitate the mastering of the surrounding systemic complexity through an active human-technical presence (i.e. the tendency toward magellanity). All these reveal certain steps in the comprehension, through human psychic system, of another system. It is not very easy to use a hypersystemic tool upon a systemic context or to force paradoxes and to surpass limitations “or not to be”.

4.1 Minding upon the systemic thinking

The synthetic representation of the systemic thinking universe is a certain performance. Here, there are to be remembered:

- J.P. Guilford’s cube (1957): human psychic system capacities as the 120 corresponding elements to Cartesian product – operations × contents × products (systems inclusively) as 5 × 4 × 6 divisions;
- R. Thom’s typology of explanatory moods upon the Reality (1987): global/local entities (e.g. local entities are global treated by general systems theory, and local treated by catastrophe theory/q.v., Table I).

Table I.

Treatment Entities	Global	Local
Global	Theology; metaphysics	Universe of objects and of analytic enlongment
Local	General systems theory; dynamics	Language analysis; theory of catastrophes

- F.S. Albus' theory of intelligence/outline (1991): state trajectory from four modules (sentry processing, world modeling, behavior generation, value judgement) on seven hierarchical layers.

Here is Solomon Marcus' conception of understanding moods upon the Reality (1990). There are four moods to be located in relation with to a representational space generated as 2D (this being the original starting point regarding this conception – as a systematization):

- (1) reflexive/empiric dichotomy; and
- (2) discursive/intuitive dichotomy.

This two dichotomous dimensions are very closed to the complementary revealed significance through: generative theory (N. Chomsky), genetic epistemology (J. Piaget), respectively, right/left brain hemisphere specialization. Table II presents four denominations of the modes of understanding the real and an outstanding philosopher for each of the four (analytical, holistic, experimental – directly denominated within a problematic context; experiential – refers to the natural, spontaneous facts, expected and received for some time, then interpreted). Reflexive/empiric dichotomy comprises: infinite/finite interaction, and competence/performance duality. Discursive/intuitive dichotomy comprises: logic/infra “logic” intellectual strategies, sequential/non-sequential. These dichotomies are not the final ones, e.g. conscious-unconscious. It is evident that the dichotomic analysis realized through moods of explanation and understanding of Reality is an heuristics – but used only (as a tool) to elicit what is essential from an extraordinary variety of our human thinking and artificial intelligence reasoning (i.e. cognitive modes). This tool is necessary to identify a basic variety of systemic thinking. As it follows, more than one mental construct is necessary – for one to overpass “systemic” boundary responsibility.

4.2 Responsibility and its (meta)indicator understanding moods

The above described systematization upon (cognitive moods) is a cognitive holistic tool for humankind research and a pattern of reflection upon reflection. It is a four-direction possibility of understanding mixed system set of indicators. This set is presented in Figure 4. Actional, informational, and decisional sub-systems of a mixed system have their own equilibrium indicators. The equilibrium of the entire mixed system aggregates all the three indicators of these three sub-systems. The result is an Eq_mixed system overall indicator. But as the hypercomplexity of human psychic system exists, a complexity of mixed system also exists. At least, human psychic system hypercomplexity induces a complexity upon any human-technical aggregation of resources. This complexity always retains a rest of facts inside mixed system. So, this

Cognitive modes	Discursive	Intuitive
Reflexive	Analytic, <i>Descartes</i>	Holistic, <i>Platon</i>
Empirical	Experimental, <i>Bacon</i>	Experiential, <i>Bergson</i>

Table II.

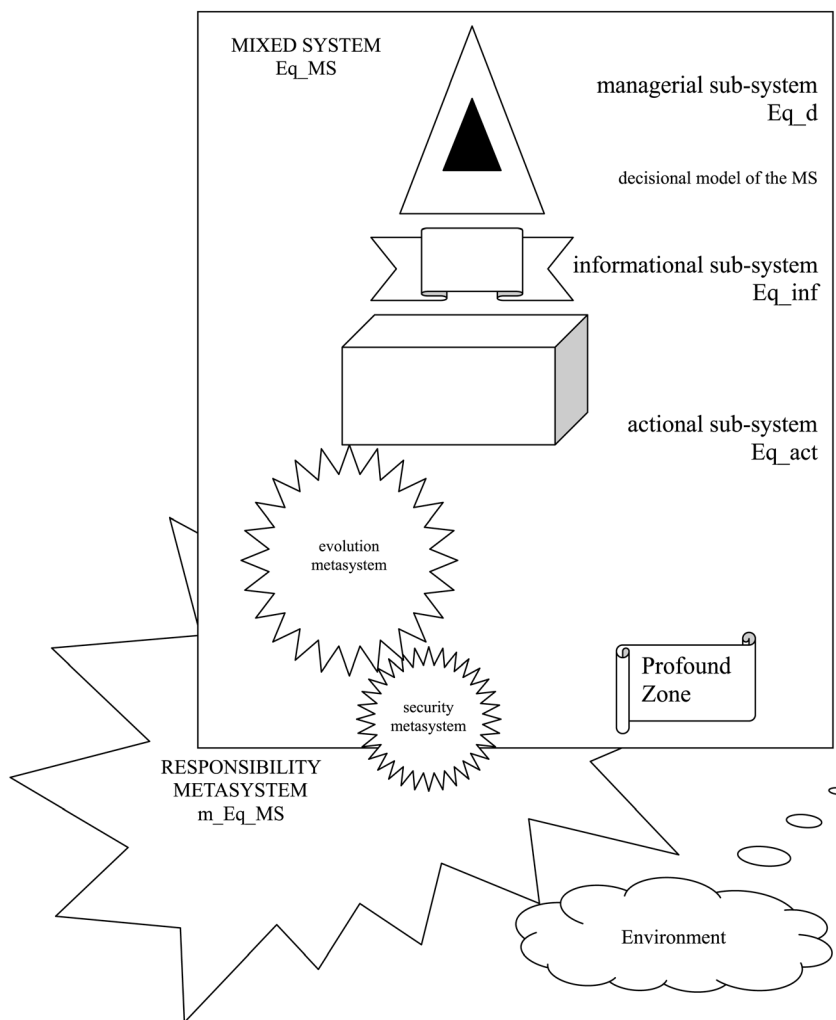


Figure 4.
Mixed system set of
indicators

rest of facts is not comprised by Eq_mixed system (the magellanity regarding comprised and not comprised facts to be expected). Thus, this rest is to be understood as mixed system evolution/security interference-denominated as responsibility and located through a responsibility zone, in Figure 4. Responsibility zone is a long-term projection of an overall goal concerning mixed system connectedness on human and technical resources both inside and outside mixed system. An autocratic (only innerly caused) evolution of a mixed system occurs very rarely, and an exclusive inner solving of mixed system security would be often desirable but less probable (sometimes but not always, inner solving being a totalitarian feature). So a meta_indicator would be proper to denominate this “inter and trans bordering” feature of the responsibility for

mixed system: m_Eq_mixed system to be its denomination. The couple (m_Eq_mixed system, Eq_mixed system) is not similarly seen according to the four varieties of the moods of thinking, and is interpreted as systemic thinking varieties. Table III presents all these. Each variety (V) of systemic thinking – inside mixed system – is to be associated with a systemic vision [or definition, or assumption, or becoming/but the denomination “vision” follows]:

Spinoza; Russel

The metaequilibrium of our system is an external matter for us. God’s features exist according to all possibilities. We can reveal it logically. (V_S;R);

Goethe

Our nature (the major system) is simple “The world could not last if it were not so simple”. Its stability is morphogenetic assured. (V_G);

Leibnitz

The impossibility of our world is very severe, not all possibilities exists. There is confidence in the local equilibrium, acquired by the construction induced from the starting locus to an appropriate outside, a.s.o. (V_L);

Cusanus

Any coincidence of previous oppositions may occurs; any couple is to be preserved through ignorant consciousness. The world is just a ludic act (game). (V_C).

And also each variety of systemic thinking (associated with a cognitive mode, and a kind of determinism) is to be provided by understanding the Reality (Table III).

4.3 Systemic entities and other entities

Focusing on the above described four varieties of systemic thinking, an aggregation of resources is to be observed on more and more significant levels. A structure and a functionality of this aggregate – an objective element. A rational subject, which is coupling itself with this aggregate. So, an entity is realized (according to Section 2) as an aggregation of the information proper to the resources from the inferior beasing of structure, step by step, till the superior beasing, bottom up. The functionality of this entity also comprises this aggregation of information (and is a part of this functionality as well).

Cognitive modes		
Varieties (V_) of systemic thinking		
	Discursive	Intuitive
Reflexive	Analitic V_Spinoza;Russell m_Eq_Sm as EXT <i>Probabilistic determinism</i>	Holistic V_Goethe $m_Eq_SM = Eq_SM$ <i>Structural selective determinism</i>
Empirical	<i>Dynamic determinism</i> V_Leibnitz Non $\exists m_Eq_SM$ Experimental	<i>Heuristics/mixt determinism</i> V_Cusanus (Eq_SM ; m_Eq_SM) Experiential

Table III.

An expansion of the upper decisions from the superior stratum of the same structure as above, similarly step by step, but top down.

A rational subject, acting V_G accordingly, states a coherent (to all the above described) scale of values – dedicated to the expected E_q and m_{Eq} (estimated/measured). Each realization of the entity (objective element, rational subject) may have its corresponding two scaled positions according to its E_q and $M_{equation}$

All those bottom up and top down informational processes are a not completely objective information status; i.e. a difficult task for rational subject/ V_G to act toward this scale of values. This difficulty is a paradox according to V_G vision.

In this context, a relevant question is posed. Is there a methodology to assure the emergent proving of the mixed system existence as system (according to Sub-section 2.1) through the realizations of the (objective element, rational subject) entity? Let be as an answer – the following steps:

- (1) Let be a rational subject, acting according to V_C variety of systemic thinking. If it is successful to estimate/measure an E_q value, then a m_{Eq} value – in spite of its V_L vision (it is another paradox, but according to V_L vision);
- (2) Let be a rational subject, acting according to V_S ; L variety of systemic thinking. If to be successful for and its results to be a m_{Eq} value, then an E_q value.
- (3) Let be a rational subject, V_C acting. It is substracing the ($m_{Eq}; E_q$) couple of values (2) – rational subject/ V_L from the relative couple (1) rational subject/ $V_S; R$ using rational subject/ V_G scale. The result of this subtracting procedure to be noted as E – the module, ever positive, related to “Entity” mental construct.
- (4) If $|E|$ is not significant (according to a V_G observation for significance assessment), then mixed system denominated entity is a systemic one.
- (5) If $|E|$ is extremely significant, then there are unbounded/not even aggregated resources.
- (6) If $|E|$ is between (4) and, respective, (5) case, then, according to V_G scale and observation of no significance and $V_S; R$, V_L , V_C acting, a world of systemhood and individualhood is revealed.

Systemic entities are located only at extremity of the world of systemhood and individualhood, at the other extremity existing only resources which are isolated objective elements. The core of this world of systemhood and individualhood is a non-systemic entities stratum. This stratum is not “directly visible”. Only through varieties of systemic thinking cooperation this non-systemic stratum can be reveled.

So, each “official” system may be a non-systemic entity or a systemic entity. Are all these a virtual effect of the above methodology? The following very short sub-section deals with this question.

4.4 Non-systemic concepts sources

Let be an exclusively triadic-itemization bibliographic base. It is an evident constrain according at least to Bertalanffy’s idea which was influential and was brought as a

base for that long (but subjective) enumeration from the last part of Sub-section 3.2. This construction is an operative cognitive one, regarding a specific re-focus upon world of systemhood and individualhood. It is the context for acquaintance with non-systemic concepts.

The triadic-itemization consists of:

- Buckminster R. Fuller – utopia or oblivion: the prospects for humanity; cap.11. Design strategy;
- K.D. Bailey – system and conflict: toward a symbiotic reconciliation;
- F. Parra-Luna – The notion of system as a conceptual bridge between the sociology of organizations and organizational efficiency.

The adequate interference between these three works, and *Romanian systemic and philosophic researches* have elicited the following axioms and propositions:

Axiom 1. There is “our” cosmos inside the universe.

Axiom 2. Human (rational subject) has a teleological existence inside cosmos. [B.R. Fuller, 1927 – ephemeralization] Cosmos has a teleological existence containing the [(H. Wald, A. Dumitriu, St. Milcu; 1976, 1990, 1995) significant, universalis, bioethical] human (rational subject).

Axiom 3'. Cosmos \Leftrightarrow teleological existence \Leftrightarrow human (rational subject)

Teleological existence \Leftrightarrow (local) life support systems

Cosmos \Leftrightarrow (local) life support systems \Leftrightarrow (self)organizing existence.

Axiom 3. (Figure 1)... (world-mind), (M*), (U), (U*)... There exists a divisibility inside the matter-reflection relation. There is a triadic matter – ego, and for each side multipoles outlook existing. So, there is a **triadic matter (substance, energy, information)** [V. Săhleanu, 1973 – *Informational biology*] and a multipolarity from its properties (generability, becoming, variability, universal connection).

There is a **triadic reflection (information-reflection element, information-model, objective information)**.

There is a plurality of the determinism (dynamic; probabilistic; heuristic). It is a continual becoming of the **matter-reflection duplex relation**.

Consequence 1. Ontic-gnostic/epistemic ring is an outlook of this duplex essence.

Consequence 2. Life is another outlook of the same duplex essence.

Proposition 1. There is a variety of life support systems.

Proposition 2. Endoreproductibility, cognition and organizing are the main features to delimitate natural, artificial and social life. These features are the turning points of an open triadic matter.

Axiom 3'. Q.v. between axioms 2 and 3

Axiom 3''. (Figure 2)

Systemic space \Leftrightarrow profound zone

Systemic space (environmental and inner spaces | versus entity's “point of view”)

Entity (rational subject \Leftrightarrow objective element | versus systemic tension)

Systemic tension \Leftrightarrow world of systemhood and individualhood

Magellanity = rational subject' attempt to world of systemhood and individualhood
[{world-mind} expressed, 1521/Magellan]

Trans – reflexivity = entity's attempt to world of systemhood and individualhood
[(U) expressed, 1936/Miguel de Unamuno]

Organizational efficiency = system's (spirituality (rational subject \Leftrightarrow Entity \Leftrightarrow System)) attempt to world of systemhood and individualhood [(P-L) expressed, 1975/Francisco Parra-Luna]

Attaining of general system attribute (idea) = matter- reflection relation as system tension (system idea).

Axiom 3'' world of systemhood and individualhood \Leftrightarrow our world \Leftrightarrow ["our"] cosmos [\Leftrightarrow universe] \Leftrightarrow world of systemhood and individualhood.

Consequence 3. Understanding and explanation of our world are the correct common expressions for magellanity, trans-reflexivity, organizational efficiency, and general system attribute on World of Systemhood and Individualhood.

Axiom 4. Only rational subject explanation/understanding upon the system exists. [S. Guiasu, M. Belis, 1968 – *quantitative-qualitative measure of information*]

Axiom 4'. (M*) circularity upon {world-mind} assures (U*) virtual identity upon (U) – multi-reflexivity between primal existence, dual model, and model of the model. [Axiom 4' is an equivalent inner definition of (U) property.]

Axiom 4''. (M*) and (U*) assures spirituality – q.v. Axiom 3''.

Axiom 4'''. (M*) and (U*) assures (P-L) – q.v. Axiom 3'' q.v. Axiom 2. [St. Odobleja, 1938-1978 – resonance logic/as a sole natural; R.Vulcănescu, 1994 – artefact logic (consequent with myth logic)/at least one possible realization; L.Culda – organizational approach to knowledge/non-"genetics harmony" genesis and becoming; G. Anca, D.Petrescu, 1992/3 – Non-evolutive systemic paradox].

Consequence 4. There is not a linearly structured, but a net structured set of Axioms 1-4; this fact reflects the net-type matter-reflection duplex relation.

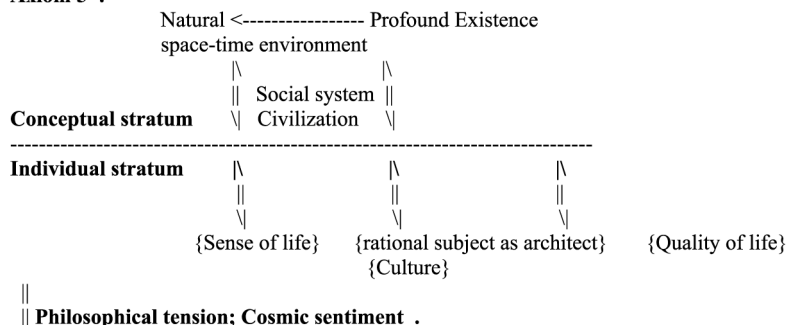
Axiom 5. (M*), (U*), and (P-L) assures (U**) – q.v. Axiom 3. [C.Portelli, 1992 – informational dialectics of the nature/as the source of "our" matter-reflection duplex net-type relation being the transcendental information and its cycle]

Consequence 5. During (U**) transcendental cycle based upon transcendental information, a wide range of systemic thinking, systemic varieties, and systemic and non-systemic entities are supported.

Consequence 6. It is possible to "understand"(only one) transcendental cycle; there is a stationarity of the spirituality of (rational subject \Leftrightarrow Entity \Leftrightarrow "(non)"-System); all of these being in the singular form as (our?) linguistics has termed – but trans-supported; the realizations of each entity and of our chronological observation of the entities being in the plural as (our!) linguistics has termed – and it received our consent for it (as life supports systems).

Axiom 5'. The Universe is made of the universal background (or ether), associated with energy quanta, information quanta, and their "strings" and "cords". *These basic entities generate space, time, substance and field.* These are built according to a Fibonacci – like rule and to the equivalence for "filling" the Euclidean space only with the help of 4, 6, 8, 12- edron faces theorem of antiquity and with the help of 32 hyperfaces in the Minkowsky 4D space (inside the fourth dimension the time is generated), and for "open" model faces for further generation with more than four dimension. [P. Constantinescu, 1982 – *Philosophy of systems*].

Axiom 5".



Philosophical tension; Cosmic sentiment .

[after M.Drăgănescu - *The profoundness of material world*, 1979; *Science and civilization*, 1984;
Reception discourse from Romanian Academy, September 6, 1990]

Axiom 6. [Sub-section 4.3] The world of systemhood and individualhood (q.v. Axiom 3") has a discrete-type structure.

Consequence 7. There are other types (along with the systemic type) inside world of systemhood and individualhood: *metasystem*, *network*, *transitron*,..., till *individity*.

Consequence 8. The *remainder* is the turning point of all these types according to the long-term functionality each above denominated type. The remainder presents or suppresses the functional emergence of **X** (*verb*, *systemic property*, *world of systemhood and individualhood property*):

A	<i>to be</i>	B	<i>to have</i>	C	<i>to do</i>	
	<i>antientropy</i>		<i>synergy</i>		<i>ephemeralization</i>	
	<i>(P-L)</i>		<i>(U)</i>		<i>{World-Mind}</i>	; ... ,

potentially suitable for each of the above denominated type through their concrete realizations inside our world.

Definition 1. A realization of a world of systemhood and individualhood entity has *A*-functional emergence if it intelligently preserves the variability of the corresponding matter or/and a triadic proper reflection (Figure 1 and Axiom 3).

Definition 2. A realization of a world of systemhood and individualhood entity has *B*-functional emergence if the integration of its elements exists.

Definition 3. A realization of a world of systemhood and individualhood entity has *C*-functional emergence if its elements are doing progressively more with less per each, versus a divisibility of the matter-reflection relation.

Proposition 3. *A*, *B* and *C* functional emergence of a realization of a world of systemhood and individualhood entity expresses anti-lethargy, and anti-obsolence, spurs a necessary change and a growth/(quasi) stationarity/evicted decline.

Proposition 4. *A*-intelligent preservation of heterogeneity implements both monotony/harmony and harmony/dissonance.

Proposition 5. B-emergence may vary between true integration and conflict (even dissolution).

Proposition 6. An entity may C-do something from consensus till conflict (Figure 2 and Axiom 3").

Proposition 7. Definitions 1-3, and Propositions 4-6 must be explained inside the Proposition 1 context, and understood inside the Proposition 2 context.

Axiom 7. [Figure 3] The types of approaches to Reality are in accordance with the multi/inter/trans-reflexivity (U/U*/U**); U being the denomination for Unamuno property (q.v. Axiom 4' – inner definition).

Axiom 8. Systemic – individual feature (as systemic tension – q.v. Axiom 3") is another general property of the matter but only in conjunction with reflection (q.v. Figure 1, Consequence 1 – explanation and understanding).

Axiom 8'.

		[(hypothetical)	ideal]			
rational subject	<to be>	[reality	□	(norms)]	<to have>
(P-L)		[model]	(U)
							{World-Mind}
							[will]
							may
							ought to
							want
System							Rational Subject

[V. Ceausu, 1978 - Uncertainty condition]

Proposition 8. The variety of life support systems must be explained inside the Axiom 8' context, and understood inside the following context:

	(P-L)		(World-Mind)
{System}	<====	World of Systemhood and Individualhood	====>
		(U)	{thing}

Proposition 9. Our world of systems and things emerges from:

- welfare toward poverty;
- from happiness toward alienation;
- from micro/macro-cosmic scientific advance to heterogeneous types of: contemporaneous countries, metropolis of the 3rd millennium, the realizations of the human being and its personality.

Remark 1. *human game* (1946)/*cybernetics*; *personality* (1972) | *FutureScape™* (1998)

Karl Gross/C. Bălăceanu, Ed. Nicolau | Irene Sanders
knowledge; self; brain (1933-1977)/*systems genesis* (1985) | *cosmic sentiment of existence* (1990)

Karl Popper/Paul Constantinescu | Mihai Drăgănescu
soul/machine | *general system*

Schmidt/Le Mettrie | von Bertalanffy

idea/matter | *percipient mind*

Plato/Aristotle | Berkeley(1685-1753)

number/flame | *atom*

Pythagoras/Heraclitus – “weeping” philosopher | Democritus “laughing”
philosopher

(c.550-c.480 BC) (c.460-370 BC)

^ Leucip (c.460-370 BC)

||

|| chrono-

|| direction

|| of reconstruction

GSI: General system idea reconstruction as representation and re-solving dichotomies; “self-recursive” systemic tension (GSI).

Remark 2. Human made artifacts, and social domains refer to rational subject, but inside the natural domain, the deepness of [“our”] cosmos inside the universe (q.v. Axiom 1) may contain “other rational subject” as *matter endowed with its own intelligence* [D. Constantin Dulcan, 1987-*Intelligence Matter*]. World of systemhood and individualhood would have another expansion.[q.v. Raymond Ruyer-*Princeton Gnosis*]

Remark 3. No rational subject can surpass:

- (1) the omnidirectional falling into infinite and/or paradoxes of the parametrical set of desirable sensitive observations;
- (2) the drama of operative thresholds and limitations confronted with an ideal (re)conceptualization;
- (3) the falling into infinite of any generated – generator reservoirs – close loop;
- (4) the unperceived (re)becoming of life from an infinite absorbent heterogeneity. Confronted with all these limitations, any rational subject may develop a systemic and non-systemic dual frame for selfguidance inside deep Reality. This means:

- (M*) inside a bordering finite domain of desirable sensitive observations;
- (U*) according to continuous cyclic reconceptualization inside an operative epistemic context;
- (P-L) according to a set of: artifacts, social limited zones, research focused upon a small or medium scaled area; and
- “expanding” concept of spirituality from the world of systemhood and individualhood base of entities which are referred to in the singular.

A duality exists inside Remark 3.

Proposition 10. If the realizations of the world of systemhood and individualhood entities are [(M*) accordingly] convergent to the whole Reality, then the duality existing inside the Remark 3, and (U**) are go:

- systemic non-consistence (contradiction) but completeness for each domain as: finite/operative/specific set/particular realization of the “expanding” concept of spirituality;

- non-systemic consistence and completeness for each of the above-mentioned domains (non emerging from an equivalent Gödel theorem frame);
- existent systemic fuzzy consistence and completeness for each domain (emerging from an non-equivalent Gödel theorem frame and Arrow theorem frame); and
- non-systemic consistence and completeness for each domain (also emerging from an non-equivalent Gödel theorem frame, and Arrow theorem frame, and impossibility indicator aggregation frame – G. Păun, 1982).

Proposition 10 must firmly demonstrate (and then must help us with a common evident magellanity sense) that systemic and non-systemic entities are strongly related to our observation, reflection (of reflection), efficiency ideal, and explain to make us understand that systemic tension is related to the general system idea as a reconstruction. Also, there are more arguments to sustain that both our systemic tension and ourselves (the finite [?] set of rational subject; living support systems) are a general property of the matter.

4.5 A note upon “holos” and “system”; “integron”

An ideal hope is to find the proofs for (all types of) systemic ancient thinking patterns which become towards contemporaneous customs for science and life. It is considered upon “individual-transitron-network-metasytem-**system** = = **holos** | versus reminder” mental reflection. *Out of the domain of this section*, it would be possible to mind as an rational subject upon an objective element without any human resources or “rationality” (an atom, a galaxy). **So, it is considered as necessary the comparisons between (at least):** *Socrates, Hypocrites from Kos, Anaxagoras/Empedocles, Aristip from Cyrene, Democrit/Leucip, Plato, Aristotle (as some epistemic polarities may be “systemic” proved), Epicur and Lucretius (an other, successive pole); the critical “moment” of Hypatia; and all their trajectory till W. Ockam, and then till M. Montaigne, J. Huarte, L. Valla, ..., P. Gassandi; Th. Moore’s and A. Tennysson’s reflections; G.G. Byron, P.B. Shelley/ M. (Godwin) Shelley’s thoughts; Kant’s deepness; A. Smith duality, “late” J.Ch. Smuts’ Holism versus L. von Bertalanffy’s General System Theory.*

A terminological “unification” for **system** = = **holos** may be **integron**. But, some long-term projective linguistic experiments are necessary (not to be elicited an other “system-holos” divergence).

5. The transition of systemic and non-systemic realizations of entities from the world of systemhood and individualhood

Let be A, B, C-functional emergencies of a realization of an entity marked with A, B, C, ... according to Consequence 8, and respective with the Consequence 7 types marked as: mixed system (mixed system/human-technical); m_mixed system (meta systems); n_mixed system (network); t_mixed system (transition); ind (individicity). Also to be marked: remainder as r/involved into -r- > (the transition from a type of world of systemhood and individualhood entity or other one); uncoordinated mixed system as m_mixed system; resources with external (quasi) aggregation as re(q)a. Table IV shows a complete set of transitions with world of systemhood and individualhood types.

Type of the source entity	Deficient	Emergence (quasi) persistent	-r- > Transition to
MS	B	C	m_MS
MS	A	C	n_MS
MS	C	A	t_MS
MS	A, B, C	[non-re(q)a]	Ind
m_MS	B	A, C	uc_MS
m_MS	B	C	m_MS
m_MS	B, C	[A]	n_MS
m_MS	A, B, C	[non-re(q)a]	T
n_MS	A, B, C	[non-re(q)a]	Ind
n_MS	A	C [B]	Ind
n_MS	A	C, B	m_MS
n_MS	A	[C]	r/d_MS, n_MS
t_MS	C	A, B	MS, t_MS
t_MS	C, A	[non-re(q)a]	Ind
t_MS	C, A, B		re(q)a
ind		A, B, C	MS

Note: A, B, C denominations are to be seen inside sub-section 4.4. – Consequence 8

Table IV.

6. A measurement technique to distinguish the systemic from the non-systemic entities

The final utility of such a technique is not to offer a quite magellany advice for a manager but to reduce the risk of applying any traditional systemic method to non-systemic entity. Obviously, the hard core will be to abilitate new specific methods to each non-systemic identified variety from our living support systems world.

So, this section only presents an identification technique. This technique is related with mathematical linguistics – as two problems of identification from two linguistic contexts were related to two supposed systemic, and respective, non-systemic entities.

The first problem (P1): Which from the systemic and the non-systemic is the proper qualifying term for Mihai Eminescu's antume poetry (1850-1889)? The graphical solution is presented as Figure 6.

The second problem (P2). Similar with P1 in a scientific work (analysis and synthesis of decisional operative sub-systems, 1995)? Figure 5 presents the solution.

The identification technique (verified upon P1 and P2) consists of a representation of the (linguistic) problem, and a graphical solution of it; then the interpretation of the solution eliciting the answer: systemic or non-related to the context (domain) of the problem.

6.1 Representation

- (1) The usage of a word-frequency pattern of the natural language proper to the text of the problem (i.e. words frequency = function (words ordinal number), word frequency from "Frequency Dictionary of Rumanian Words", Mouton &

Co, 1965; NJ – the number that reflects the natural ascending order versus the decrease in word frequency).

- (2) The usage of a notion/word frequency pattern for the (con)text of the problem P1, and for P2 – for P1 related to “About Self and Sense inside Eminescu’s Utterance” (in Romanian), Editura Mondero, 1993; for P2 related to a personal measurement of a personal scientific text).
- (3) The unification as words ordinal number of the independent variables of both P1 and P2, relative to the most frequent word: “eye” for P1, “system” for P2.
- (4) Words Frequency = function (words ordinal number) representation for P1 and P2 (after the “double whole” representation, then the polygonal contours corresponding to the observed concentration of the points are marked).
- (5) Verifying of all local (contextual) heuristic algorithmic methods.

6.2 Solution

- (1) Identification of the discontinuities proper to words frequency = function (words ordinal number).
- (2) Identification of groups of words (notions) with high frequencies.
- (3) Identification of the correlation between the first and the second sets resulting from the above two solution steps; resulting a specific string.
- (4) Comparison of the elements of the specific string identified above with other functions (related to the same (context) of the same words ordinal number; for P1 there were “other functions”).
- (5) Interpretation of the set of functions for each problems. The result is: graphic harmony (M. Mesarovic’s notion) for P1; graphic monotony for P2.

7. Conclusions (resulting from P1 and P2 comparative solutions)

Proposition 11. There are graphical harmony/non-systemic entities, respective graphical monotony/systemic entities according with two types from the world of systemhood and individualhood: metasystem (m_SM)/mixed system. [There is the evidence from P1/P2 solutions.]

It is necessary to underline that the above presented measurement techniques related to poetry and scientific texts show their metasytemic, respectively systemic lexical background. As there is a profound relation between thinking and language, it is possible to hope for a future identification of systemic and meta-systemic patterns of poetry and scientific thinking. It is a real base for a profound understanding of a part of the living support system.

Figures 5 and 6 present the graphical solutions for P1 and P2.

Figure 7 presents an iconic synthesis of this procedural hope.

Proposition 12. If a lexical background and a related identification measurement technique would be a generative linguistic tool proper to be generalized inside a part (at least) of living support system, then systemic/non-systemic differentiation conceptualization might be a hopeful “unrevealed yet profound zone” (possible source for useful inventions and surprising discoveries).

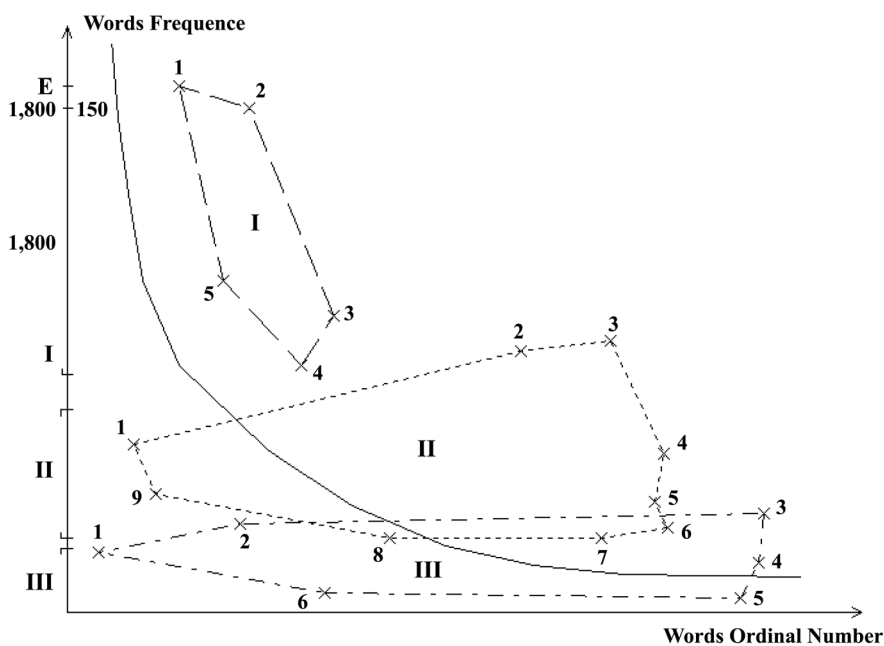


Figure 5.
Identification of
metasystemic context
inside Mihai Eminescu's
antume poems

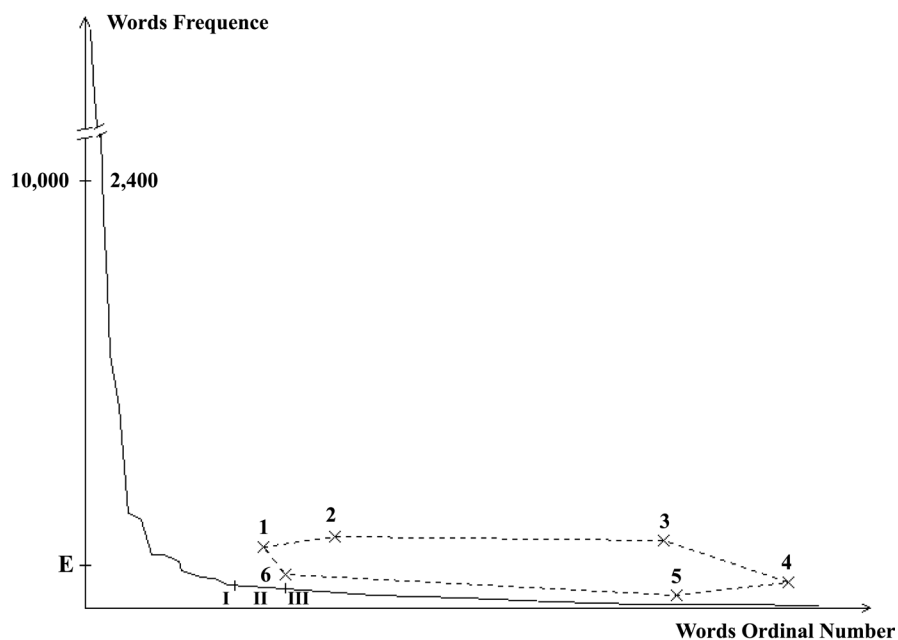
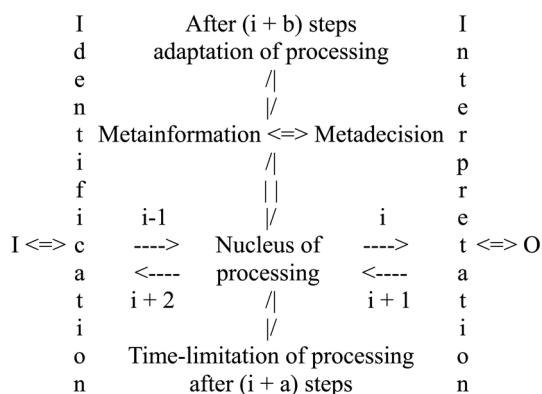


Figure 6.
Identification of systemic
context inside a scientific
text

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Figure 7.
Iconic synthesis



Notes

1. This research finds the methodological background to manage both consensus and conflict concepts; a proper systemic representation is assured to prove that a real system needs both sides, not incompatible or even contradictory as they are seen in sociology (Bailey, 1997).
2. The authors together with other 25 researchers are dedicated themselves to the way the natural and social science can work together to analyze and handle complexity shown up in societal problems (DeTombe and Dijkum, 1996).
3. This is a multidisciplinary volume upon the major problems of the civilization, science, Semantics, information and culture; the focusing idea is that of philosophical tension of humankind; academician Draganescu is the prominent leader of a long-term very active group of interdisciplinary studies; recent structural-phenomenological studies upon mind, consciousness, information and society are enriching his long-term achievements as forerunner; his prodigious and original corpus of works is wide range reflected by scientists and readers – the no-reaction is nearly absent (Draganescu, 1984).
4. This work is an original elaborated one; it deals with the design strategy, seen as the holistic answer for 40 question (from the meaning of the Universe to the truth), operating with proper ordinate concepts, and attaining General Systems Theory as comprehensive and anticipatory problem solving; non-entropy, synergy and ephemerization are analyzed (Fuller, 1969).
5. These are the bridgeheads of long-term research related to the historical cradle and a peak of Sociocybernetics; professor Geyer is not only an interdisciplinary scientist but also a prominent leader of more than 200 researchers dedicated to contemporary social complexity (Geyer, 1977).
6. Advanced Synergetics. Instability Hierarchies of Self-Organizing Systems and Information and Self-organization. A Macroscopic Approach to Complex Systems Springer (1988); Synergetic Computers and Cognition, Springer (1991); Molecular Physics and Elements of Quantum Chemistry with H. C. Wolf, Springer (1995); Principles of Brain Functioning. A Synergetic Approach to Brain Activity, Behavior, and Cognition, Springer (1996); Brain Dynamics. Synchronization and Activity Patterns in Pulse-Coupled Neural Nets with Delays and Noise, Springer (2002) (Haken, 1977).
7. This is a dedicated work to “focused dialogue process” through a new methodological and informational product: FutureScape™ used to facilitate strategic thinking inside various area: planning (strategic community, conference, project, curriculum), new product and career development, training (Sanders, 1998).

8. The author together with other 14 researchers are dedicated themselves to a deeper insight into ominous developments, and to better understand how changes and developments are generated, in order to regain the control over these. Taormina R.J. presents the human integration; Hiwaki K. presents the dual: development of the theory of interest/interest theory of development; Andonian G. presents the humanity in architecture; Hiller J. presents the problems of the telemedicine, Corning P.A. presents the group selection controversy in the evolutionary theory; Boyd G. McL. presents the liberative education, Murphy D. presents steps to a preservation of culture; their and their colleagues ways into the natural and social science aggregate a synergistic impact to the sociopolitical developments of the 3rd millennium (Lasker, 1998).
9. This presents the hypothesis: any type of human and social competence is based on our linguistic generative competence – this being one of the most significant follows from Naom Chomsky's 1964-published work | inside some contexts this hypothesis was verified; professor Marcus is the founder/leader of a mathematical linguistics school; he is the author of about 300 research papers and 30 books, quoted by about 1000 authors; he was honored – at the 75 birth day – by a dynamic group of researchers, assistants, and enthusiastic readers (Marcus, 1974).
10. This is a comprehensive research presenting an aritmomorphic attempt upon systemic globalization; the emergent values dedicated to progress are: freedom, order, justice, health, wealth, knowledge, prestige, conservation of nature, qualities of activities (Parra-Luna, 1998).
11. This work provides extensive concepts upon knowledge, action, perception, memorization, and decision; the turning point is the “epistemo-praxiological loop” associated with mathematical described operators; there is an intimate objectivity-subjectivity link developed from a “radical constructivism” toward a “well temperate constructivism” (Vallée, 1995).

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Appendix. Glossary

Mixed system = actional, informational, and managerial | decisional sub-systems; responsibility metasystem; profound zone.

Systemic approach = (hypothetical) real – model – ideal (norms); human psychic system; general system (theory) idea | its reconstruction.

Equilibrium approach = (meta)equilibrium of a mixed system; couple (m_Eq_MS, Eq_MS).

Information = information-reflection element, information model; objective information.

Matter open triad = substance, energy, information; matter | reflection; objective element(s), level(s); interaction(s), connection(s); rational subject, entity, system, profound zone... (mixed system).

Spirituality = rational subject \Leftrightarrow entity \Leftrightarrow system.

Cognitive dichotomies = reflexive/empirical; discursive/intuitive.

Cognitive modes [and varieties of = analytical, holistic, experimental, human systemic thinking (and artificial experiential intelligence reasoning)].

Systemic thinking (its varieties) = V_S; R [Spinoza; Russell, V_G | Goethe, V_L | Leibnitz, V_C | Cusanus].

World of systemhood and individualhood = entities around a rational subject and systemological attempt.

Properties of entities from the world of = antientropy, synergy, systemhood and individualhood ephemerization.

Magellanity (M*) = non-observable real – notion(s) inside (M).

Magellanity (M) = (non-)observable real; mental concept/construct; (non-)theoretic concept; notion(s) – only local dual connections.

Organizational efficiency (P-L) = system's (spirituality) attempt to world of systemhood and individualhood.

Unamuno property (U), (U*), (U**) = types of approaches upon Reality, * virtual identity for ideas domain, ** general system idea | attribute of the matter/trans-reflexivity.

Paradoxes and limitations = spirituality (rational subject, entity, system); systemic – non-systemic context for Gödel's, Arrow's, Păun's equivalent – non-equivalent theorem frames | their surpassing.

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PINK = (psychology, intelligence, neural, knowledge) generation of artifacts.

{World-Mind} travel = (M*), (U), (U*), (U**), (P-L) inside (M).

i.e. = (id est; that is to say).

e.g. = (exempli gratia; for example).

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q.v. = (quod vide; which see).